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# A thermodynamic study of unusually stable RNA and DNA hairpins.

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About 70% of the RNA tetra-loop sequences identified in ribosomal RNAs from different organisms fall into either (UNCG) or (GNRA) families (where N = A, C, G, or U; and R = A or G). RNA hairpins with these loop sequences form unusually stable tetra-loop structures. We have studied the RNA hairpin GGAC(UUCG)GUCC and several sequence variants to determine the effect of changing the loop sequence and the loop-closing base pair on the thermodynamic stability of (UNCG) tetra-loops. The hairpin GGAG(CUUG)CUCC with the conserved loop G(CUUG)C was also unusually stable. We have determined melting temperatures (Tm), and obtained thermodynamic parameters for DNA hairpins with sequences analogous to stable RNA hairpins with (UNCG), C(GNRA)G, C(GAUA)G, and G(CUUG)C loops. DNA hairpins with (TTCG), (dUdUCG), and related sequences in the loop, unlike their RNA counterparts, did not form unusually stable hairpins. However, DNA hairpins with the consensus loop sequence C(GNRA)G were very stable compared to hairpins with C(TTTT)G or C(AAAA)G loops. The C(GATA)G and G(CTTG)C loops were also extra stable. The relative stabilities of the unusually stable DNA hairpins are similar to those observed for their RNA analogs.

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